U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-271 907

Voluntary Environmental Activities of Large Chemical Companies to Assess and Control Industrial Chemicals

Environmental Protection Agency, Washington, D C

Sep 76

PB 271 907

EPA 560/4-76-009

VOLUNTARY ENVIRONMENTAL ACTIVITIES OF LARGE CHEMICAL COMPANIES TO ASSESS AND CONTROL INDUSTRIAL CHEMICALS

September 1976

OFFICE OF TOXIC SUBSTANCES
U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

This document is available to the public through the National Technical Information Service, Springfield, Virginia 22151

TECHNICAL REPORT DATA

EPA 560/3-76-009	PB-257 907
Voluntary Environmental Activities of Large Chemical Companies to Assess and Control Industrial Chemicals	September 1976
Office of Toxic Substances U.S. Environmental Protection Agency Office of Toxic Substances 401 M Street, SW Washington, DC 20460	Final
U.S. Environmental Protection Agency Office of Toxic Substances 401 M Street, SW Washington, DC 20460	500/11

This Report is intended to help clarify the extent and character of the activities of companies in the United States with sales of industrial chemicals exceeding $100 million annually to assess and, as necessary, control these chemicals beyond the environmental requirements set forth by Federal, State, and local authorities. The Report should help establish a baseline of such activities as of early 1976. The impact of governmental efforts to stimulate additional activities in the future can then be judged against this baseline.

KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Chemical Industrial Industrial Stewardship Corporate Responsibility Toxic Substances Control		
Release Unlimited	Unclassified	20
4	Unclassified	68A - 68I

EPA 560/4-76-009

VOLUNTARY ENVIRONMENTAL ACTIVITIES OF LARGE CHEMICAL COMPANIES TO ASSESS AND CONTROL INDUSTRIAL CHEMICALS

Prepared by the

OFFICE OF TOXIC SUBSTANCES

U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEPTEMBER 1976

PREFACE

This Report is intended to help clarify the extent and character of the activities of companies in the United States with sales of industrial chemicals exceeding $100 million annually to assess and, as necessary, control these chemicals beyond the environmental requirements set forth by Federal, State, and local authorities. The Report should help establish a baseline of such activities as of early 1976. The impact of Governmental efforts to stimulate additional activities in the future can then be judged against this baseline.

The conclusions set forth in this Report are based on information and impressions obtained during discussions with spokesmen for a number of trade organizations, professional associations, and related groups, and with officials of a number of individual companies which are reasonably representative of the industry. These discussions were supplemented by visits to numerous industrial R&D, health and safety, and manufacturing facilities throughout the country during the past three years. Comments on the conclusions of the Report, as well as other pertinent information, would be welcomed by the Office of Toxic Substances.

TABLE OF CONTENTS

Preface	i
BACKGROUND	1
THE ROLE OF THE BOARD OF DIRECTORS	3
CORPORATE STRUCTURE AND ENVIRONMENTAL DECISION-MAKING	5
CAPABILITIES OF HEALTH AND ENVIRONMENTAL STAFFS	7
ASSESSMENT AND CONTROL OF PROBLEMS ASSOCIATED WITH EXISTING CHEMICALS	9
ENVIRONMENTAL "OUTREACH" ACTIVITIES	13
THE ROLE OF TRADE ASSOCIATIONS	14

Background

Each large chemical company has a unique profile in its organizational and management approach, its technical and marketing activities, and its operating philosophy and style. Each of these companies buys, produces, and sells hundreds or thousands of chemicals, including some chemicals which could be environmental hazards, and many more mixtures and formulations of these chemicals. Each company has its own historical precedents, its own financial structure, and its own set of experiences and biases concerning Governmental intervention in the private sector.

Against this background of diversity within the industry, a few generalizations have been drawn. Obviously, there will be exceptions to almost every conclusion, but nevertheless a number of common threads concerning corporate behavior with regard to environmental and health concerns seem to emerge. Since this study was conducted over a three-year period, a few of the observations may be a little out of date, but the general thrusts of the conclusions appear to persist in 1976.

Clearly, most corporate activities directed to health and environmental concerns that have been put in place in recent years have been driven to a great extent by Federal and State requirements for abatement of air and water pollution, Federal requirements governing registration of pesticides, drugs, and food additives, and the regulations concerning shipment and in-transit storage of the Department of Transportation. Most recently, actions by the Occupational Safety and Health Administration and, to a lesser extent, the Consumer Product Safety Commission have influenced the scope and character of company activities. While this Report is directed to environmental stewardship activities concerning industrial chemicals beyond those activities required by law, industrial programs resulting from such legal requirements have been instrumental in shaping the character of additional voluntary actions.

The reasons behind voluntary actions by companies beyond those required by law are manyfold. For example, product liability and union pressures concerning worker safety are of concern to all companies. The reputation of the company and the public relations value of environmental stewardship programs are often significant factors.

The personal environmental concerns of individual executives in top management positions and the pressures within the company exerted by the scientific staffs for greater environmental efforts are often decisive. Finally, the pressures of the Governmental research agencies such as the National Cancer Institute, the National Institute of Occupational Safety and Health, and the National Institute of Environmental Health Sciences, as well as the latent threat of future Governmental regulatory intervention at the national or local levels, often direct company attention to specific products and problems.

This Report does not attempt to sort out these and other reasons for environmental stewardship efforts. Rather, it describes environmental stewardship activities in very general terms to help provide a framework for accelerated efforts in this important area in the future.

The Role of the Board of Directors

Only very rarely is an environmentalist appointed to the Board of Directors of a chemical company, and seldom does the Board draw upon environmental expertise beyond the operating staff of the company. Thus, the Board is not in a position to make technically credible and independent assessments of the soundness of the environmental considerations incorporated into recommendations that it receives.

Almost all, if not all, Boards of Directors have adopted a broad environmental policy framework intended to guide company activities. In some instances, such policies are strikingly limited to simply calling for strict compliance with environmental and health regulations promulgated by Governmental authorities. In other cases, the policies are more broadly directed to protecting health and the environment and, by implication, they call for environmental assessments and environmental restraint beyond legal requirements. The character of Board-adopted policies ranges from relatively short and general exhortations about the importance of environmental considerations, to more explicit and detailed procedural guidance to operating staffs, to explicit endorsement of rather extensive films and other communications that are disseminated widely throughout the company.

However, seldom does the Board follow up with a systematic examination of the actual impact of its adoption of an environmental policy framework on the improved environmental acceptability of company operations. Nor does the Board carry out a hard-headed evaluation of the effectiveness of organizational, administrative, and operational adjustments that may flow from the policy. Thus, it is generally very difficult to discern the impact of Board involvement in establishing general environmental policies -- in contrast to or in addition to the impact of Governmental regulations -- on the way business is conducted at the working level.

All Boards have become very aware of the need to take into account environmental considerations when making major investment decisions. They are particularly sensitive to the likelihood of stricter pollution and worker exposure regulations and are increasingly concerned over the possibility of Governmental action against carcinogens and other toxic chemicals. In general, in making investment decisions, the Boards seem far more concerned in understanding what the Government may require than delving into the details of the

health and environmental risks associated with the proposed activities which might warrant steps in addition to Governmental requirements.

Environmental concerns, and particularly those triggered by Governmental actions, are frequent agenda items for the Boards. Company organization, environmental expenditures, Governmental regulations, and actions on specific products of questionable environmental acceptability are often discussed. However, the more general topic of environmental stewardship -- beyond what is required by law -- is seldom probed in depth.

Corporate Structure and Environmental Decision-Making

The operating divisions and the plant managers within these divisions remain the profit-making focus, and hence the organizational backbone, of most companies. They largely determine whether environmental stewardship directed to existing chemicals and existing facilities is simply a slogan or is a reality. Specialized corporate staffs have yet to make major in-roads in influencing the environmental behavior of the line managers beyond fulfilling legal requirements, and promotion incentives for the line managers continue to pivot on maintaining high levels of production at minimum cost. Occasionally, environmental and health staffs within the divisions or subordinate to the plant manager, drawing on but seldom responding to the expertise of centralized corporate staffs, have significantly influenced day-to-day operational activities of environmental stewardship significance.

Most large companies now have central staffs concerned with medical affairs (principally but not exclusively physical examinations and plant accidents), toxicology (assessments of the health effects of selected chemicals), and air and water pollution. Occasionally, staffs for ecological studies of industrial chemicals (usually aquatic studies) have been established as an off-shoot of ecological studies directed to pesticides. In almost every company mechanisms are now in place to help insure that these central staffs have the opportunity to comment on any significant new facility investment and new product line. Usually, one of the members of the company's top management team has line responsibility for the activities of these staffs. Occasionally, there is a division of responsibility at the top level between medical and health concerns, on the one hand, and pollution and ecological concerns. In some companies, however, lack of adequate staff resources seriously impedes the ability of these central staffs to participate adequately in the decision-making process.

Company management, and particularly the line managers in the operating divisions, is seldom anxious to question the environmental acceptability of important items in the company's product line. However, central staffs, prodded by such actions as the NIOSH List of Suspected Carcinogens, have begun to take the initiative to question the hazards associated with existing chemicals. In general, these staffs have yet to demonstrate that they will be a significant

force in the decision process when a chemical important to the company's profit is at stake. Also, a variety of decisions taken by the operating divisions may not come to the attention of the central staff.

While the organizational positioning of R&D activities varies among companies, this organizational entity exerts considerable influence on company decisions, often as a parent or as an ally of the toxicology staff. Clearly, with regard to new chemicals, the views of the R&D unit are usually decisive. With regard to existing chemicals, the views will at least be heard since there is almost always R&D representation at the highest levels of the company.

The company's staff for Governmental affairs, which is almost always closely tied to the legal staff, usually participates in environmental decision-making. However, this staff is more concerned with development of regulations and with compliance than with stewardship activities.

Capabilities of Health and Environmental Staffs

As would be expected, these relatively few companies with in-house animal toxicological facilities devoted to industrial chemicals have potentially strong capabilities to identify chemical problems and to characterize chemicals suspected to be hazardous. However, even these companies have relatively little experience in prioritizing existing chemicals for in-depth evaluations, reviewing and evaluating available sources of information on the selected chemicals, identifying the full range of possible environmental impacts from acquisition of raw materials and manufacture through disposal, and developing appropriate control strategies. Other companies which have in-house toxicological facilities devoted to drugs and pesticides presumably could build on this core of expertise in developing assessment capabilities directed to industrial chemicals. Those companies which have relied principally on contract research in the toxicology area are usually very limited in the quantity and qualifications of available personnel to work in this area.

In the medical area, the major concern of chemical companies has traditionally been directed to physical examinations of workers and to health care following plant accidents, with the doctors and nurses headquartered at production sites. Many of the doctors are part-time company employees with private practices in near-by communities. Indeed, a few companies still do not have qualified medical directors at the corporate level for insuring high quality medical standards and for providing advice to top management. During the past several years, the increased importance of epidemiological investigations to help correlate chemical exposures and long-term effects has emerged as a priority concern, but few, if any, companies are adequately staffed or have their record systems in suitable condition to make major inroads in this area. Even the limited studies to date have been seriously hampered by lack of capabilities to develop adequate study designs.

Every major chemical company has a formidable array of environmental engineers committed to (a) retrofitting existing facilities to meet pollution abatement requirements, and (b) designing new facilities that incorporate the most cost/effective pollution control equipment, usually in anticipation of future requirements. At the same time, these companies are not strong in monitoring capabilities and have little experience in developing and using techniques for measuring low levels

of many toxic chemicals, and particularly organic compounds. However, these companies have an array of good analytical chemists and access to the latest scientific equipment; thus, it should be relatively easy to mobilize the necessary resources to make major strides in this area. The past approaches of the industrial hygienists in gross monitoring to determine compliance with OSHA standards and the techniques for measuring gross pollution parameters in air and water are clearly not adequate to determine trace level concentrations of many worrisome chemicals in discharge streams or as product contaminants.

Two neglected areas within the staff capabilities of most companies are (a) ecological effects, and (b) environmental transport and fate. Thus, these staffs have relatively little capability to develop and use laboratory and field testing methods that will clarify the movement and behavior of industrial chemicals in the environment, including persistence, bioaccumulation, degradation products, and eventual environmental sinks. With a few exceptions, the total capability in these areas is currently committed to pesticide problems.

Assessment and Control of Problems Associated with Existing Chemicals

The approaches of large chemical companies to chemical assessment and control can be addressed in three rough groupings of chemicals: (1) chemicals clearly identified by the Government as problems, with the likelihood of near-term regulatory actions of major import to curb the problems; (2) chemicals clearly identified by the Government as possible major problems, but with a questionable likelihood of near-term actions to sharply curtail activities associated with the chemicals, and (3) other chemicals. In the first category, for example, have been vinyl chloride, polychlorinated biphenyls, and the 14 carcinogens now regulated by OSHA, and in the second category benzene and chlorofluorocarbons. When confronted with a problem in the first category, the companies usually take a number of steps to limit environmental exposure even before regulations are in place. With regard to the second category, the companies almost always emphasize the need for and frequently support additional research rather than adopting any precautionary control measures. The third category, which includes the vast majority of commercial chemicals, is the principal focus of this Report.

Only recently have a number of the companies begun to identify within a central staff (1) chemicals which the company handles and to review (2) potential hazards associated with each. Typically, the procedures that are evolving are along the following lines. A master list of all chemicals that are purchased, manufactured, and sold is prepared. Governmental lists of potentially harmful chemicals are correlated with the company's list and the overlap noted. Company specialists revies the company list, and taking into account the overlaps, make subjective judgements based on individual backgrounds and experience as to which chemicals deserve priority attention. These priority chemicals, which usually represent a small fraction of the total company list, are then subjected to detailed literature searches. Should the results of the literature search raise questions concerning the chemical's environmental acceptability, toxicity testing might be initiated, or as is more often the case, warnings might be issued to employees and customers concerning the potential hazard.

Related to this chemical audit procedure are two other activities common to many companies, namely, preparation of a safety data sheet for each chemical that is manufactured

and preparation of a label for each chemical that is shipped. Safety data sheets, which are intended for use within the company and also by customers, vary widely from simple recitations of data found in chemistry textbooks to information generated through original company research efforts. Similarly, labelling activities vary widely from simply fulfilling Department of Transportation labelling requirements to providing detailed instructions on handling, use, and hazards. Seldom do the labels address disposal procedures. Some companies have established internal labelling committees which have the power not only to design each label but to prevent shipment of the chemical if the hazard is considered uncontrollable. Other companies are far less organized and the environmental staffs, and indeed top company officials, have difficulty being alert to all of the chemicals which are shipped out the gates of different plants and the labels, if any, that are displayed on these chemicals.

Only a few industrial chemicals that are already in commerce are currently being subjected to long-term toxicological testing by individual companies. Some of the company efforts in this regard are channeled through trade associations and related groups as described below. Since the protocols used in company testing programs are often developed without outside consultation, there would undoubtedly be significant differences of opinion concerning the adequacy of the designs of some of the experiments. In general the tests conducted in-house seem to be reasonably well carried out by qualified personnel. Recent findings of the Senate, FDA, and EPA have raised questions concerning the quality of contract testing activities. Several companies have developed capabilities to conduct the "Ames" test and are subjecting both existing and new chemicals to this screening technique.

Serious testing of existing industrial chemicals for environmental fate and effects is the exception rather than the rule within industry. In a few cases, increasing attention is being directed to aquatic toxicity although lack of sound test procedures and qualified personnel is a handicap.

Few managers of chemical manufacturing facilities know the total chemical cross-section of the airborne and waterborne discharges leaving plant property. Furthermore, no facility routinely monitors the ambient pollution levels in the biota, soil, and sediments surrounding plant property to

ascertain whether there is a build-up of either the chemicals being discharged or their degradation products. Several companies have occasionally taken environmental samples at the fenceline and at the end of the pipe and subjected them to total chemical analyses, but these activities are usually undertaken from the point of view of research rather than possible control steps.

While there has been considerable discussion within companies concerning the need for scientific study of worker populations to correlate chemical exposures with suspected health effects, investigations funded by industry in the epidemiological area have been very limited. Apparently, industry has never supported serious epidemiological investigations of populations living near industrial complexes which might be exposed to chemical discharges.

Most manufacturing plants turn their solid waste, including hazardous waste, over to private contractors for disposal. Seldom, if ever, is there a rigorous follow-up effort by the company to insure proper disposal by the contractor, and company contracts with the vendor do not usually emphasize this aspect.

Assessment of Problems Associated with New Chemicals and Chemical Processes

During the past several years, and partly as a result of the proposed Toxic Substances Control Act, the large chemical companies have adopted more systemmatic and thorough procedures for assessing the environmental acceptability of new industrial chemicals under development. These procedures are frequently patterned after the experience that has been gained in evaluating a new drug or pesticide, with the extent of the investigations expanding as the likelihood of commercial acceptability increases. However, as would be expected, the test program for an industrial chemical would probably not be as intensive as the program required by the Government for a drug or pesticide.

Generally, the companies with in-house testing capabilities are able to carry out the most effective premarket screening programs, using the scientific staffs in an advisory as well as in a testing role. Also, they are able to introduce mid-course corrections in testing programs, to follow-up unusual findings very quickly, and to maintain a high degree of quality control. All of these areas present difficult problems when operating test programs under contract arrangements.

Since almost all premarket screening and decision-making is conducted without external consultation, there are inevitably questions as to the adequacy of the tests that are performed and the appropriateness of the weight given to environmental considerations in the decision process. In a few cases companies have announced publicly their plans to develop major new chemicals and have actively sought inputs from regulatory agencies in designing their test programs. In general, these companies seem to be receptive to modifying their plans to accommodate at least some of the inputs.

As concern over toxic chemicals grows within Government and among the public, there seems to be a concomitant tendency within industry to minimize the development and use of chemicals of questionable safety while seeking wider applications of the less hazardous chemicals.

A neglected area is the evaluation of the likely environmental impact of changes in formulations and mixtures. Given the large number of chemicals and products involved, greater attention to methods for assessing such impacts would seem in order.

Environmental "Outreach" Activities

The record of the large chemical companies in making available to the Government, other companies, and the public adverse information concerning chemical hazards is mixed. Recently, there have been a number of highly publicized cases of industry releasing information concerning the impact of chemicals on worker's health. In several cases the companies that reported the data had previously abandoned the product in question. There are also instances of adverse toxicological data not being released.

Some companies encourage publication of toxicological and related data developed by company scientists, while others consider that the effort required to transform data points into an acceptable scientific paper is not warranted. Similarly, some companies send representatives to make major contributions to national meetings on environmental health, while others send representatives simply to listen.

In general, there is reasonably good sharing of industrial experiences as to methodologies and general approaches to chemical assessment and control but little sharing with regard to experiences with specific chemicals. In part this reticence may be attributed to trade secret problems and, possibly, anti-trust concerns.

The large chemical companies have shown little concern over the environmental behavior of their suppliers and customers, and particularly very small companies. Seldom are small suppliers asked to provide effects data on their chemicals, even if the chemicals are being manufactured in commercial quantities for the first time in response to batch orders from large companies. Seldom, if ever, do the large companies question the environmental soundness of the housekeeping practices of small suppliers. Similarly, relatively little effort is devoted by the major companies to helping upgrade the environmental and health capabilities of small customers. While there are specialized technical services units in every large company, their charters and their capabilities apparently do not extend to upgrading the environmental capabilities of the customers who cannot afford the types of expertise available to the large companies.

The Role of Trade Associations

As indicated in Appendix A, a number of trade associations are actively involved in the identification and characterization of chemical problems. They vary widely in membership, staff capabilities, availability of resources, and policy and program interests. They have many overlapping interests, and it is not uncommon for several organizations to be addressing the same problem. As would be expected, their activities directed to specific chemicals almost always involve chemicals manufactured by at least several companies. Information developed by these organizations is generally available to the Government and to the public, and they are invariably interested in contributing their expertise and viewpoints to the efforts of regulatory agencies.

A number of animal toxicological test programs are being supported by trade associations. Occasionally, epidemiological studies are also supported. Almost all of the industrial chemicals being tested have been identified by Governmental agencies as possible problems. While the testing protocols are usually designed by recognized toxicological experts, the trade associations have not been particularly eager to seek out the formal views of regulatory agencies and to incorporate them into the protocols.

In addition to animal testing and epidemiological work, the trade associations have also supported aquatic studies and atmospheric investigations related to specific chemicals of concern. In these areas, they have frequently called upon academic scientists to carry out the studies, usually under the guidance of an industry steering committee.

The trade associations provide many forums for the airing by Governmental and industry representatives of general and specific chemical concerns. They are usually willing to respond to Governmental requests, even on very short notice, to assemble the leading industrial specialists to address particular problems. They usually provide written responses promptly and in detail to Governmental inquiries although they are seldom, if ever, willing to take the initiative in identifying future chemical problems.

The recently established Chemical Industry Institute of Toxicology (CIIT) plans to support toxicological investigations of selected high volume industrial chemicals. Unfortunately, the decision processes in selecting chemicals

to be tested and in designing the test protocols do not provide for effective Governmental inputs, with the possibility that the data resulting from the tests may not satisfy future regulatory requirements. While the establishment of CITT and the expansion of individual company testing programs are beginning to fill a void in the assessment of industrial chemicals, the industrial resources being directed to this area are still very small in relation to the magnitude of the task ahead and industry profit levels in recent years.